

(No Model.)

2 Sheets—Sheet 1.

C. WAHL.
VACUUM PAN.

No. 250,694.

Patented Dec. 13, 1881.

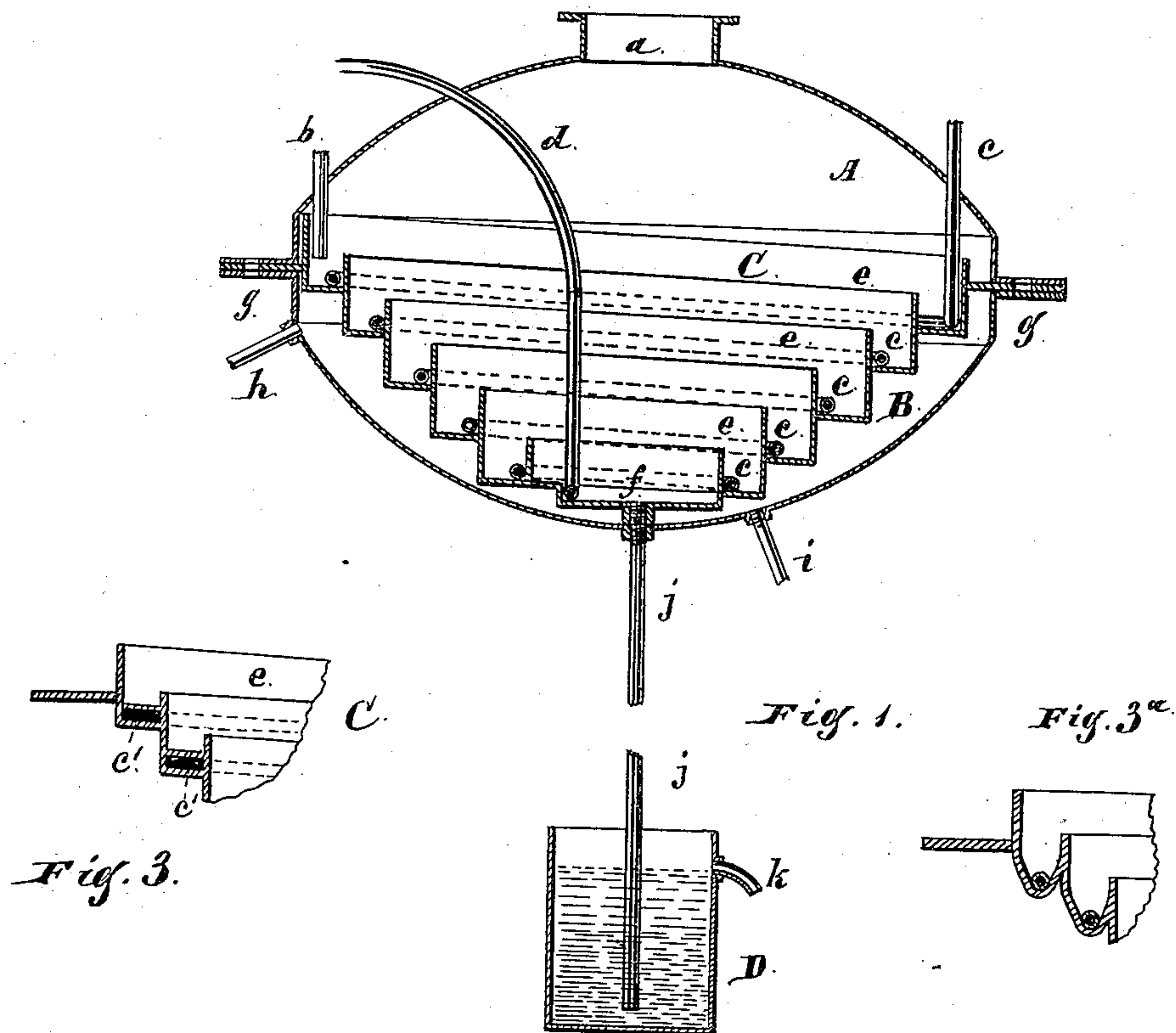
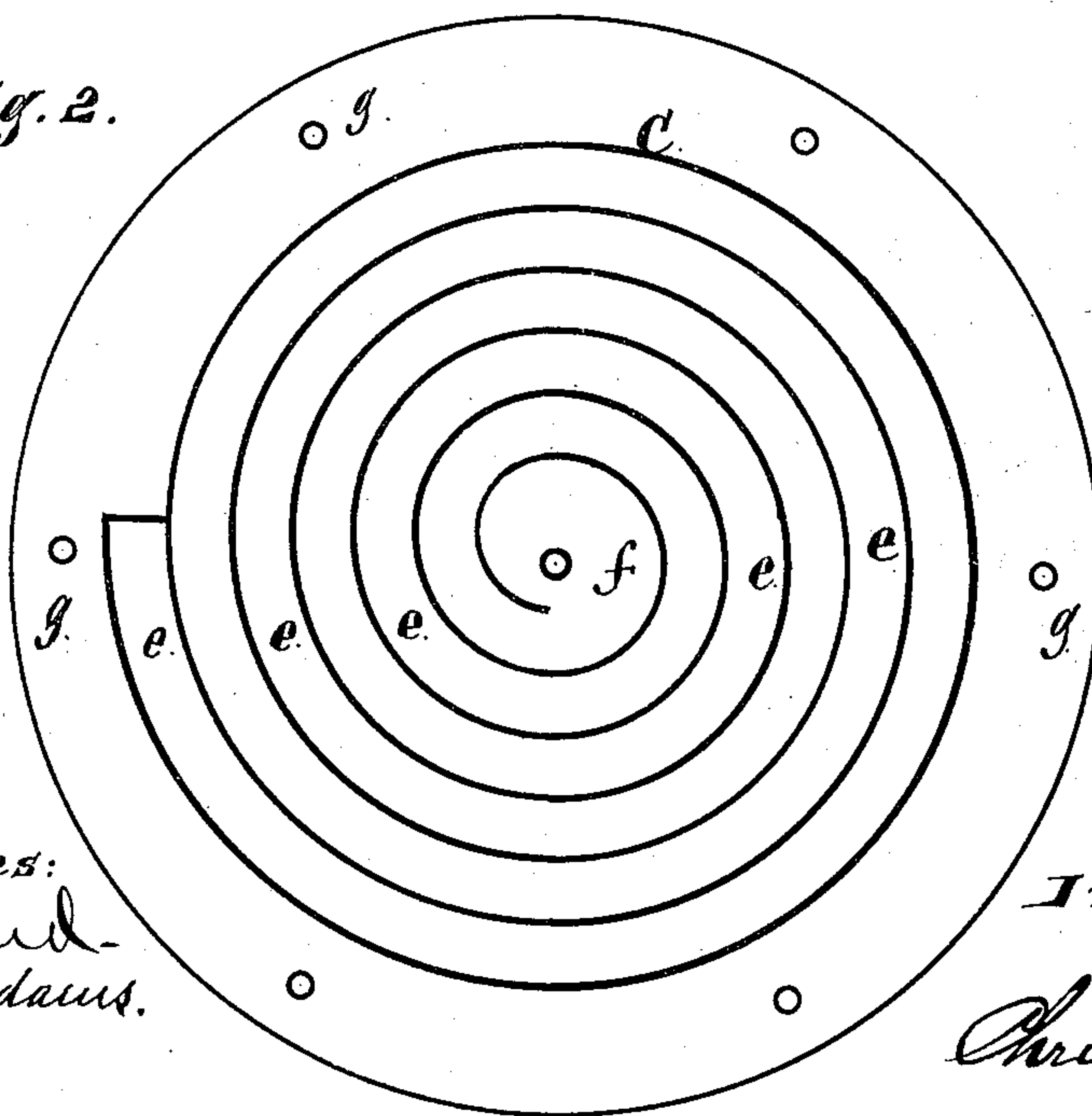


Fig. 2.



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Albert H. Adams.

Inventor:

Christian Wahl

(No Model.)

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Fig. 4.

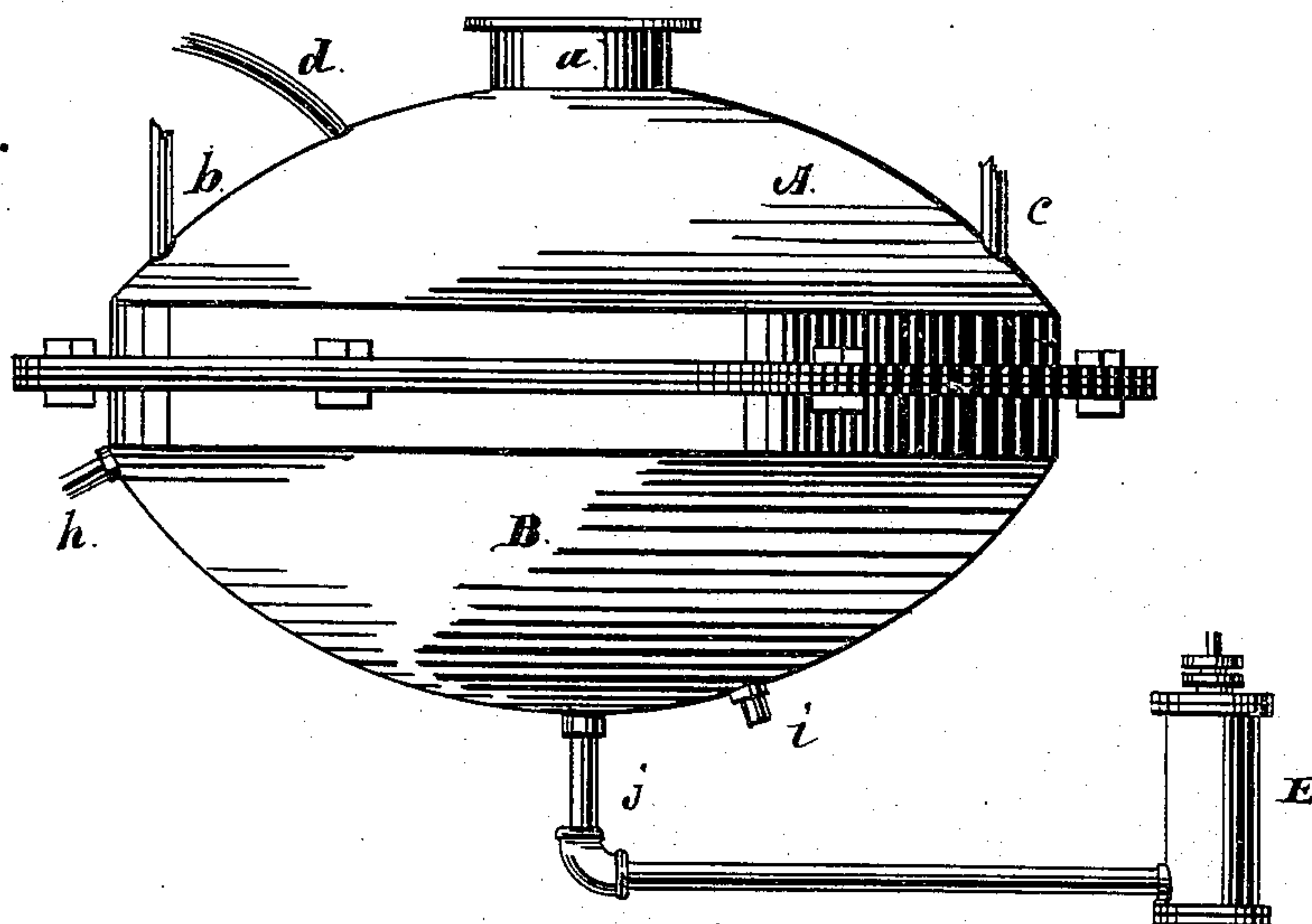
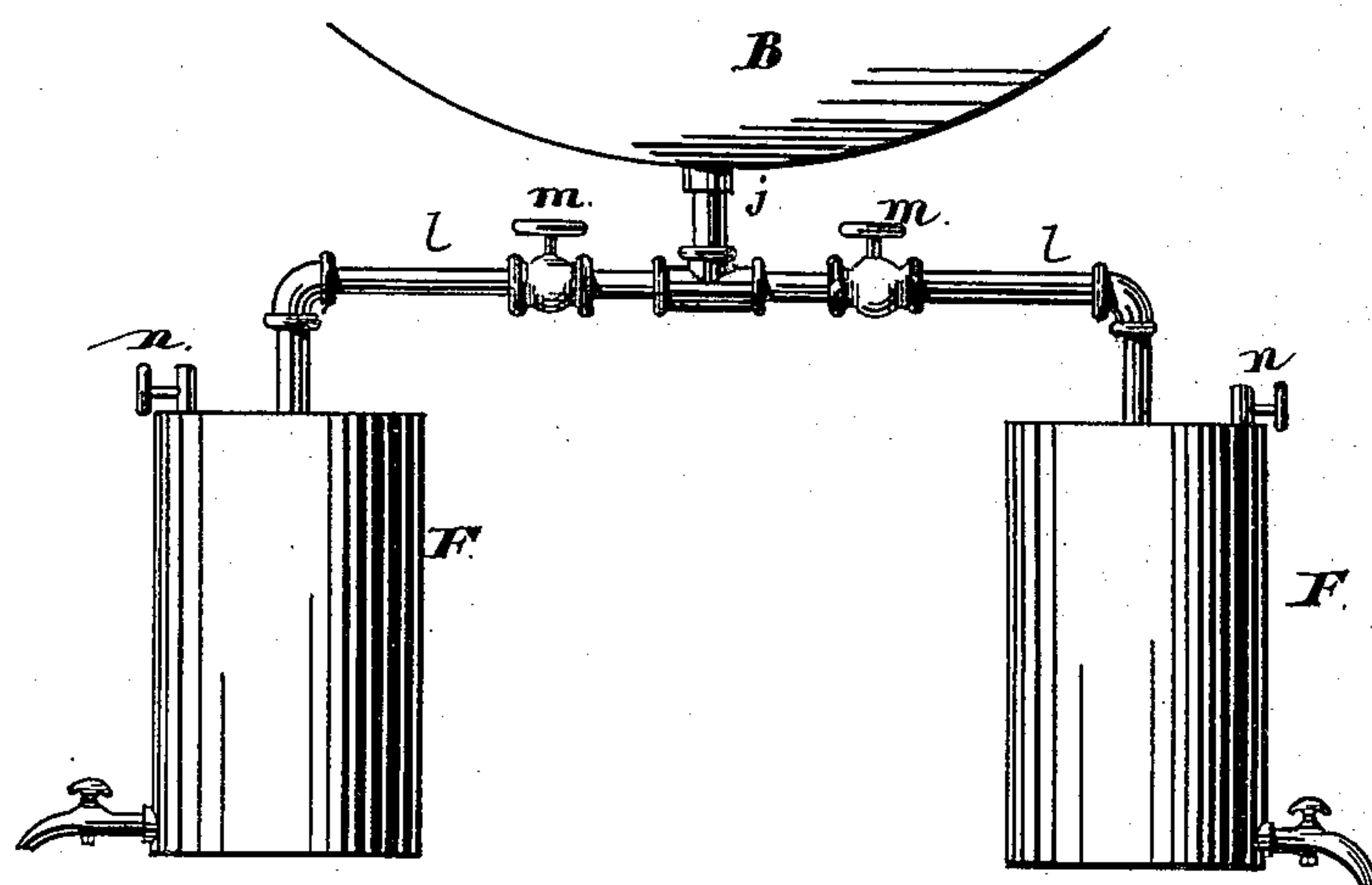


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHRISTIAN WAHL, OF CHICAGO, ILLINOIS.

VACUUM-PAN.

SPECIFICATION forming part of Letters Patent No. 250,694, dated December 13, 1881.

Application filed May 27, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN WAHL, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Vacuum-Pans, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section; Fig. 2, a plan view of the liquid-pan; Figs. 3 and 3^a, modified forms for forming the bottoms of the channels; Fig. 4, a side view or elevation, and Fig. 5 an exterior elevation of a device for receiving the evaporated or treated liquid.

The object of this invention is to improve the construction and operation of vacuum-pans used for evaporating liquids or liquid solutions by heat; and its nature consists in providing the liquid-pan with a scroll or extended channel having a sufficient length to reduce the liquid passing through to the desired consistency before it escapes, and so formed that the material or liquid passing through will have its parts kept separate or uncommingled in its passage through the pan, or having the divisions or walls high enough to prevent the fresher parts from mingling with the partly or fully condensed parts of the stream flowing through; in an improved method of applying steam, and in the means for disposing of the treated liquid, the vacuum-pan or evaporating apparatus being designed and arranged for continuous operation.

In the drawings, A B indicate the exterior shell or casing, the lower half or section also constituting a steam-jacket; C, the liquid-pan; D, a trap or receiver; E, a pump; F F, alternating receivers; *a*, orifice to which the exhausting pump or apparatus is applied; *b*, feed tube or opening; *c*, a steam-inlet pipe and coil resting in the bottom of the liquid-channel; *d*, an outlet or steam-escape pipe; *e*, the liquid-channel; *f*, the lower or central portion of the channel for the condensed material; *g*, holes through the flanges for bolting or securing the parts A B C together; *h*, steam-inlet to the jacket B; *i*, an exhaust or blow-off for the steam-jacket; *j*, tube or pipe for conducting the finished or condensed material from the pan; *k*, an overflow-pipe for the trap-receptacle D; *l*, horizontal side or branch tubes for

shortening the tube *j*, or for conducting the finished or condensed material to a side pump or to one or more receivers; and *m*, valves or cut-offs.

The shell A B is preferably made of cast-iron; but it may be made of copper or other suitable metal, and it is made of any suitable size or diameter necessary to accomplish the desired result on the liquid treated.

The liquid-pan C is, by preference, made of copper; but it may be made of other sheet or cast metal. When made of sheet metal the preferable way is to make it stepped, as shown in Fig. 1, and to solder, braze, or otherwise secure the risers which complete the channel to the inside, so that any imperfection of workmanship will not be subjected to steam-pressure and vacuum. The risers form in the liquid-pan a continuous circular or scroll channel from the feeding pipe or opening *b* to the lower end at *f*. The pitch of this channel *e* will depend upon the diameter, number of turns, and depth of the liquid-pan. The liquid-pan is formed with a flange extending out between the flanges of the shell by which the sections are united. This construction forms a complete partition between the upper and lower sections of the shell, so that the upper part of the device can be used as a vacuum-chamber and the lower part as a steam-jacket.

For the purpose of increasing the heating-surface or applying steam at a higher heat and pressure than would be proper with a steam-jacket, I place in the channel *e* one or more coils of steam-pipe, *c*. The coils may be made to cover the bottom of the channel, or the bottom may be made V-shaped, so that a smaller stream or less flow of the material will be required to cover the steam-coil; and for a very thin or shallow stream or flow, instead of using steam-coils made of pipes, the bottom of the channel may be formed as shown at *c'*, Fig. 3 or Fig. 3^a.

For disposing of the treated or finished liquid when the building or premises are of a convenient height, the easiest and simplest way is to run the pipe *j* down about twenty-eight feet into an open trap or receiver, D, containing a sufficient height of the material above the lower end of the pipe to form a seal to prevent the air from rising through it. The receiver D is provided with an overflow-spout, *k*,

by which the material or condensed liquid is directed into any suitable vessel. When a suitable height for this operation is not convenient or desirable, the condensed liquid may be removed by a pump, E, or by receivers F, attached to branch pipes *l*, provided with cut-off stops or valves *m*, so arranged that either receiver may be cut off and emptied while the other is in use. The contents of these receivers may be drawn off by providing them with spigots and vents *n*.

The coil *c* and the steam-jacket are to be provided with ordinary safety-valves, steam-traps, and other ordinary appliances.

The feed-tube *b* will lead from any suitable feeding-receptacle, and it is to be provided with a stop or cut-off valve, so that the flow of the thin liquid may be regulated or stopped.

The shell A may be provided with one or more glazed inspection-holes, and the exhausting apparatus for forming and maintaining the vacuum in the pan may be of any of the known forms used in connection with vacuum-pans. This apparatus will be found very efficient and useful in reducing or condensing milk, saccharine juices, gelatinous liquors, glucose, beer, bark-extracts, gas waters, &c.

I have shown and described my device as circular and somewhat globular in form; but this form is not essential, as it may be made square or of other angular form, and the discharge may be at one side or corner instead of the center.

It is evident that steam for the coil may be admitted through the pipe *d* and blown off at the pipe *e*, and it will improve the operation of the scroll or channel to make it of a gradually-diminishing width from the upper or outer end to the lower or discharging end, so that a uniform depth of liquid will be maintained from one end of the channel to the other.

I am aware that vacuum-passes with and without steam-jackets have been used heretofore for reducing or condensing liquids; but in these old pans there was no channel and no separation of the parts composing the liquid to be treated. Therefore the work of condensing required a long time, and during this time the liquid is exposed to the more or less deteriorating influence of the heat, and the liquid being treated in masses or batches, the mass remains in the pan until the whole is reduced to the required consistency, and owing to the great depth or height of the mass and its increasing density, as it approaches the required degree of condensation, it becomes difficult for the steam, gas, or air-bubbles to rise or escape, and if they are formed rapidly they are liable to lift or foam the liquid, so that it will boil over; and losses of considerable quantities of liquid are frequent from this cause.

By my plan the defects and disadvantages recited are avoided, as the liquids are not

treated in mass, but they flow through the device in a well-defined thin or shallow stream, which permits of an easy and free escape for all of the vapors or gases, however rapidly they may be formed, and no overrunner is required for catching escaping liquids, and the presence of an attendant is not required. The amount or degree of condensation can be regulated by the feed, as a heavy or nearly-full stream will pass out with less condensation than a shallower or lighter one, and the inflow or feed can be regulated or adjusted by a valve or cock in the feed-tube.

The great length of time which the liquid is required to remain in the old style of pans in order to attain the proper degree of concentration not only imparts a darker color to those liquids, but often changes their very nature. These defects are completely avoided in my pan, for the reason that the liquid does not remain therein for any length of time, but passes through it in a few minutes, during which passage the concentration takes place.

This apparatus can also be successfully used for "drying" lard, or taking out of it the water, which gives it a tendency to sour, and by operating the device without steam in the jacket or coil, or with cold water in place of steam, it will be found useful for cooling beer or other liquid, as, passing them by the channel *e* through the vacuum, the heat is rapidly and greatly reduced or completely taken out.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The liquid-pan C, having the continuous descending channel *e*, in combination with the shell A, forming a vacuum-chamber, substantially as specified.

2. The liquid-pan C, having the continuous descending channel or groove *e*, in combination with the shell A and steam-jacket B, substantially as and for the purpose set forth.

3. In a continuously-operating vacuum-pan, the continuous and descending channel *e*, in combination with the steam coil or passage *c*, substantially as described.

4. In a continuously-operating vacuum-pan, the liquid-pan C, having the channel *e* and coil *c*, in combination with the jacket B, substantially as set forth.

5. In a continuously-operating vacuum-pan, the combination of the liquid-pan C, having the descending channel *e*, with the pipe *j* and a suitable trap, receiver, or pump for taking off the treated liquid, substantially as specified.

6. The combination and arrangement of the shell A B and liquid-pan C, having the channel *e*, with the coil *c*, feed-tube *b*, and discharge-tube *j*, substantially as described.

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Witnesses:

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